VWR ®

sympHony™ Handheld Meters
H10P, H10C, H10D, H30PCO & H30PCD models

sym**pH**ony™

User Manual
Manual del Usuario
Manuel d'utilisation
Bedienungsanleitung
Manuale d'uso

Table of Contents

Table of Contents

Section 1   Specifications

Specifications are subject to change without prior warning.

Specification	Details
Dimensions	19.4 x 9.2 x 4.3 cm (7.62 x 3.62 x 1.71 in.)
Weight	400 g (0.88 lb) for the most complete model
Meter enclosure	IP 67
Housing materials	PC/ABS, Santoprene
Measurement modes	By Stability (user-adjustable in pH and ORP values) By Time (user-adjustable) Continuous
Data storage (Data logger)	Up to 500 measurements 10 most recent calibrations Sensor history
Self test	The user can test the keypad and screen
Languages	English, Spanish, French, German and Italian
Power requirements (internal)	4 AA alkaline batteries or nickel metal hydride (NiMH) rechargeable batteries
Input and output connectors	MP-5 connector (IP 67) for models H10P, H10C and H10D MP-8 connector (IP 67) for models H30PCO and H30PCD USB connector (for downloading data to a PC)
Temperature	Storage: – 15 to 65 °C (5 to 149 °F) Operating: 5 to 40 °C (41 to 104 °F)
Operating humidity	80% (non condensing)
Certifications	cETLus (to current standards for UL, CSA) CE
Warranty	3 years
Measurement configuration (PROFILES)	Up to 10 (user defined)
pH	
Instrument range	-2 to 19 pH
Resolution	0.1/0.01/0.001 pH (selectable)
Reproducibility	± 0.01 pH (± 1 digit)
Relative accuracy	≤ 0.01 pH (± 1 digit)
Temperature compensation	Via an ATC probe or manual entry
Calibration	Up to 5 calibration points Buffer Types: Technical Buffers, NIST Buffers, To a Specific Value, Data Introduction and Theoretical Values Automatic rejection of electrodes in poor condition

Specifications

Specification	Details
ORP	
Instrument range	± 2000 mV
Resolution	0.1/1 mV (selectable)
Reproducibility	± 0.1 mV (± 1 digit) (0.5%)
Relative accuracy	≤ 0.2 mV (± 1 digit)
Calibration	Automatic recognition (220 mV @25 ºC), To a Specific Value, Data Introduction and Theoretical Values
Temperature	
Instrument range	-20 to 150 °C (-4 to 302 °F)
Resolution	0.1 ºC
Relative accuracy	≤ 0.2 ºC (≤ 0.4 °F) (± 1 digit)
Calibration	Correction of probe deviation (25 ºC and 85 ºC)
Probe type	Automatic recognition of the connected probe Pt 1000 or NTC 22 K**Ω** ***
Conductivity	
Instrument range	Conductivity: 0.001 µS/cm* to 1000 mS/cm**
	Resistivity: 1 **Ω*** to 1000 M**Ω***
	Salinity: 0.0 to 42 ppt practical salinity (standard method 2520B)
	TDS: 0.000 mg/L to 4444.4 g/L
Resolution	Variable (autorange)
Reproducibility	± 0.1% (± 1 digit)
Relative accuracy	≤ 0.5 % of the measured value (± 1 digit)
Temperature compensation	Conductivity: via a probe or by manual entry Reference Temperature (Ref. Temp.): 15, 20, 25 ºC or any value between 0 and 99 ºC. Temperature Coefficient, variable 0 to 9.99 %/ºC
Calibration	Up to 3 calibration points Standard types: Molar (KCl), Demal (KCl), NaCl St. 1014.9 µS/cm, To a Specific Value, Data Introduction and Theoretical Values Cell constants accepted: 0.001 to 199.9 cm^{-1}
TDS Factor	Programmable between 0.01 and 4.44
Dissolved Oxygen (DO)	
Instrument range	0.00 to 60.0 mg/L (0.0 to 600 %)
Resolution	0.01 mg/L (from 0.00 to 19.99 mg/L) 0.1 mg/L (from 20.0 to 60.0 mg/L) 0.1 % (from 0.0 to 19.9 %) 1% (from 20 to 600 %)

Specification	Details
Reproducibility	± 0.2 % (± 1 digit)
Relative accuracy	≤ 0.5 % of the measured value (± 1 digit)
Temperature compensation	Automatic with NTC sensor
Calibration	Water Saturated Air, Water Sat. Air & Zero, To a Specific value (determined externally with Winkler) and Theoretical Values
Pressure compensation range	600 mBar to 1133 mBar (450 to 850 mm Hg)
Salinity correction	From 0 to 45 ppt

* with C= 0.1 cm^{-1}

** with C= 10 cm^{-1}

***In the range 70 to 90 ° C the instrument doesn't automatically recognize the probe. If a probe is connected while measuring in this range, the instrument will prompt the type of probe connected.

Section 2   General information

2.1   Safety information

NOTICE
The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

2.1.1   Use of hazard information

⚠ **DANGER**
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ **WARNING**
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION**
Indicates a potentially hazardous situation that could result in accident or minor injury.

NOTICE
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

2.1.2   Precautionary labels

🗑	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after August 12. 2005. In conformity with European local and national regulations (EU Directive 2002/98/EC). European electrical equipment users must now return old or end-of-life equipment to the Producer for disposal at no charge to the user.
⚠	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument refer to the instruction manual for operation or safety information.

2.2   Certification

Canadian Radio Interference-Causing Equipment Regulation, IECS-003, Class A:

Supporting test records reside with the manufacturer.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

FCC Part 15, Class "A" Limits

Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1.   The equipment may not cause harmful interference.

2.   The equipment must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

1.   Disconnect this equipment from its power source to verify that it is or is not the source of the interference.

2.   If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.

3.   Move the equipment away from the device receiving the interference.

4.   Reposition the receiving antenna for the device receiving the interference.

5.   Try combinations of the above.

Section 3   Product overview

The VWR sympHony™ meters are used with probes to measure various parameters in solutions. Primarily for field use, the portable meter operates on four AA batteries. Handheld sympHony™ meters are available in 5 models:

1. H10P: pH meter
2. H10C: conductivity meter
3. H10D: dissolved oxygen meter
4. H30PCO: pH, conductivity and oxidation-reduction potential (ORP) meter
5. H30PCD: pH/mV/ORP, conductivity and dissolved oxygen meter

3.1   Product components

Refer to Figure 1 Components to make sure that all components have been received. If any items are missing or damaged, contact the manufacturer or a sales representative immediately.
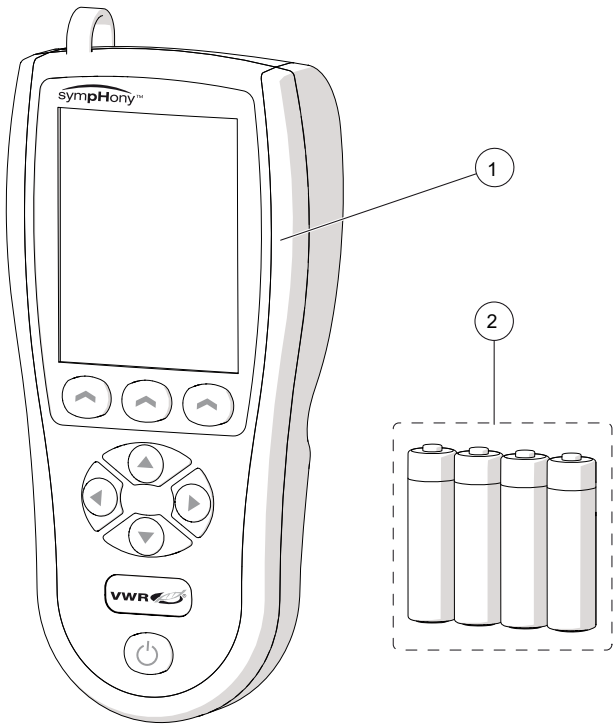
Figure 1 Components

1	Meter	**2**	Batteries

Section 4   Installation

4.1   Battery installation

> ⚠️ **WARNING**
>
> Explosion hazard. Incorrect battery installation can cause the release of explosive gases. Be sure that the batteries are of the same approved chemical type and are inserted in the correct orientation. Do not mix new and used batteries.

> *NOTICE*
>
> When using nickel metal hydride (NiMH) batteries, the battery icon will not indicate a full charge after freshly charged batteries have been inserted (NiMH batteries are 1.2 V while alkaline batteries are 1.5 V) Even though the icon does not indicate a complete charge, 2500 mAH NiMH batteries will achieve 90% of instrument operation lifetime before needing recharge compared to new alkaline batteries.

> *NOTICE*
>
> To avoid potential damage to the meter from battery leakage, remove the batteries prior to extended periods of non-use.

The meter can be powered with AA alkaline or rechargeable NiMH batteries. To conserve battery life, the meter will power off after 5 minutes of inactivity. The value for the inactivity time can be changed in

1. Pull the release tab of the battery compartment and remove the cover, as shown in Figure 2 Battery installation

2. Install four AA batteries (alkaline or nickel metal hydride) in accordance with the polarity markings inside the compartment.

3. Replace the battery cover.
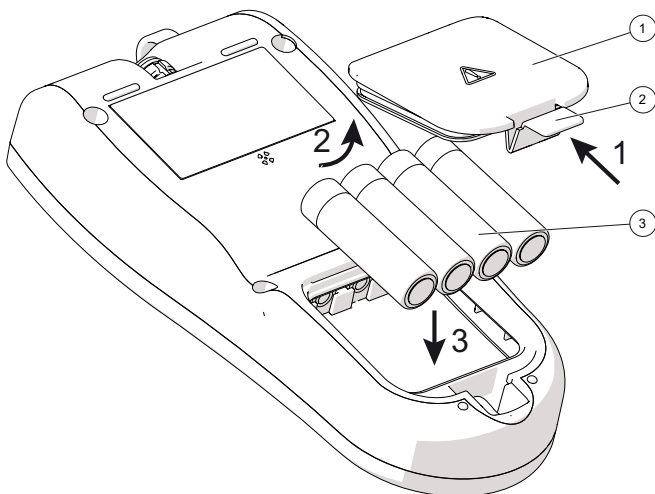
Figure 2 Battery installation

1	Battery cover	**2**	Release tab	**3**	Batteries

4.2 Connecting a probe
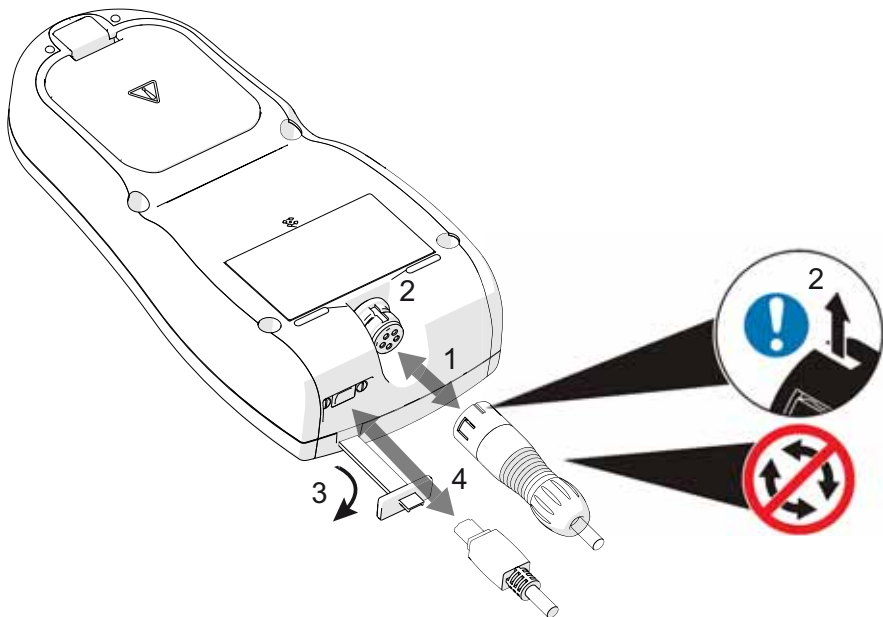
Figure 3 Probe and USB connections

1. Connect the probe to the meter as shown in Figure 3 Probe and USB connections.

2. Push the connector so that the alignment pin goes into the groove on the female connector.

Important Note: Do not turn the connector.

4.2.1 USB connection

3. Remove the protector from the connector (Figure 3 Probe and USB connections).

4. Connect a compatible USB cable (Cat. No. 89236-588).

4.2.2 Multisensor probe connection

The following multisensor probes can be used with the H30PCO and H30PCD meters. The meter will prompt the user to identify which sensor is being used during the initial setup.

H30PCO Meter:

- Probe Cat. No. 89231-656: pH, conductivity and oxidation-reduction potential (ORP)

- Probe Cat. No. 89231-658: pH and conductivity

H30PCD Meter:

- Probe Cat. No. 89231-660: pH, conductivity and dissolved oxygen

- Probe Cat. No. 89231-658: pH and conductivity

Important Note: The meter must be restored to factory default settings if a different multisensor probe is used after initial setup. See 8.11 Restore the factory settings on page 33.

Section 5   User interface and navigation

5.1   User interface
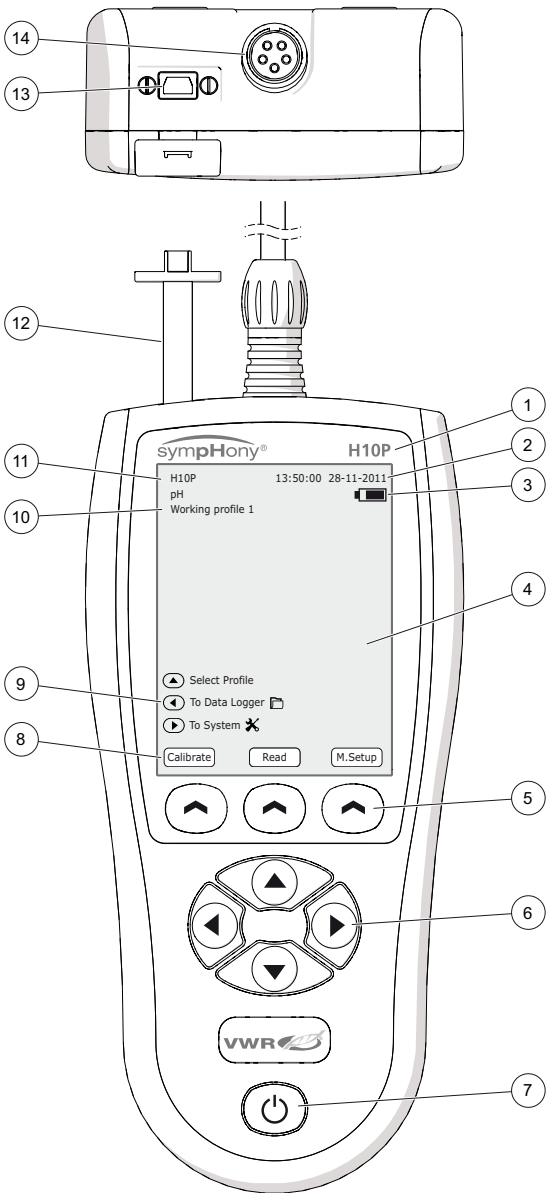
Figure 4 User interface

1	Model	**8**	Soft key display (varies depending on the operation)
2	Date and time	**9**	Direct options (arrow keys access the options shown)
3	Battery indicator	**10**	Profile ID (if active)
4	Display	**11**	Instrument ID and parameter(s)
5	Keypad, soft keys (selects the option shown above the key)	**12**	USB connector protector
6	Keypad, arrow keys (scrolls through menu options)	**13**	USB connector (transfers data to a PC)
7	Power key: turns meter on/off	**14**	Probe connector

5.2   Display description

The display shows different views, depending on the operation.
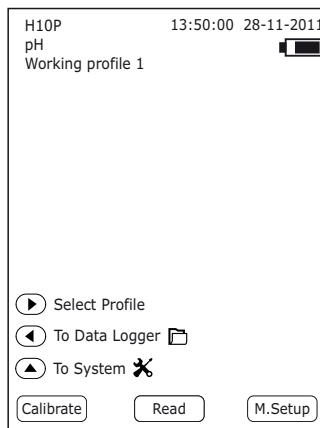
Figure 5 Standby screen

Standby screen. The meter display shows the date and time, battery indicator, instrument ID, active profile* and measurement channel(s).

Using the soft keys the user can:

- *CALIBRATE*: access calibration options
- *READ*: start a measurement
- *M. SETUP*: access measurement setup

User interface and navigation

Using the arrow keys the user can:

- Select a different *PROFILE**
- Access the *DATA LOGGER* 🗅*
- Access *TO SYSTEM* ✗

* These options are displayed if activated, see
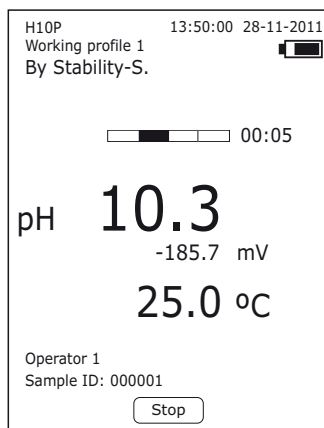
Figure 6 Channel measurement view

Channel measurement view. The meter display shows: date and time, battery indicator, instrument ID, active profile*, measurement mode programmed, measurement timer, value measured, alternative units**, sample temperature***, active user* and sample ID**.

*These messages are displayed if they are activated.

** These options are displayed if they are set up, see

*** The sample temperature may be automatic (temperature sensor) or entered manually by the user

Figure 7 Multiple measurement view

Multiple measurement view. The meter display shows: date and time, battery indicator, instrument ID, active profile*, measurement mode programmed, measurement timer, value measured, alternative units**, sample temperature***, active user* and sample ID**.

*These messages are displayed if they are activated.

** These options are displayed if they are set up, see 8.1 Meter options on page 29

*** The sample temperature may be automatic (temperature sensor) or entered manually by the user

5.3 Navigation

VWR sympHony™ meters display different options and messages to guide the user in the use and setup of the meter. Examples of several display views are shown below.
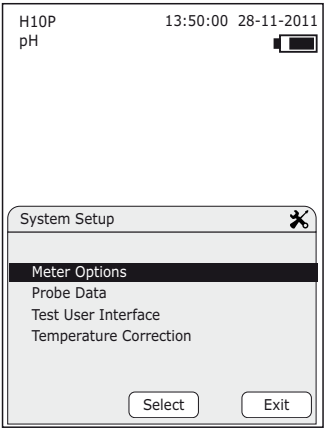
Selection menu. Use the arrow keys to highlight the desired option and press *SELECT* to enter the menu. Press *EXIT* to go back.
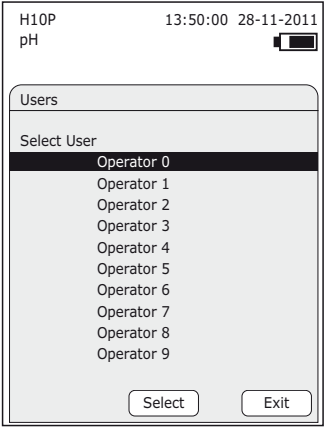
Selecting from a list. Use the arrow keys to highlight the desired option and press *SELECT* to select it. Press *EXIT* to go back.
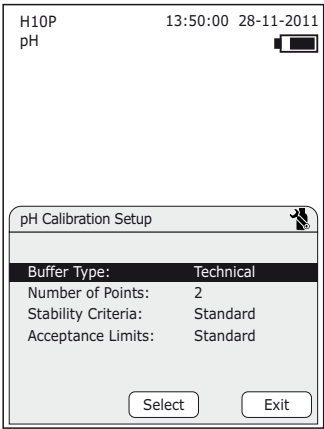
Setup menu. Use the arrow keys to highlight the desired option. The list shows the current setup value. Press *SELECT* to enter the menu and change the setup. Press *EXIT* to go back.
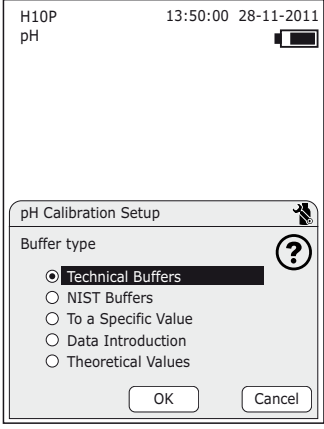
Setup options. Use the arrow keys to highlight the desired option. Press *OK* to select it and return to the setup menu. Press *CANCEL* to leave without making any changes.

```
H10P                 13:50:00  28-11-2011
pH
                                      ████



  ┌─────────────────────────────────────┐
  │ System Setup                    ✕    │
  ├─────────────────────────────────────┤
  │  Password Protected:                 │
  │                                      │
  │    Enter Password: ▓0000 ⬍           │
  │                                      │
  │                                      │
  │        ┌────────┐    ┌────────┐      │
  │        │   OK   │    │ Cancel │      │
  │        └────────┘    └────────┘      │
  └─────────────────────────────────────┘
```
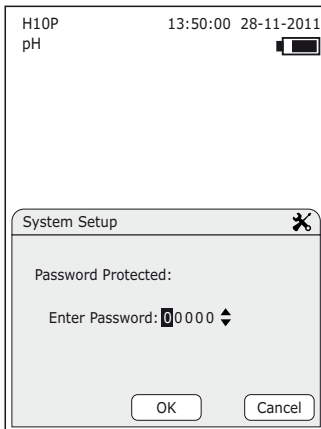
Changing/Entering values. Change the value using the *UP/DOWN* keys, scroll to the next value using the *LEFT/RIGHT* keys. Press *OK* to accept the new value. Press *CANCEL* to return to the menu without making any changes.

```
H10P                 13:50:00  28-11-2011
pH
Working profile 1                     ████



  ┌─────────────────────────────────────┐
  │ Measurement Setup               🔖   │
  ├─────────────────────────────────────┤
  │ Measurement mode:                    │
  │  ◉ By Stability - Standard      ┌─┐  │
  │  ○ By Stability - Configurable  │?│  │
  │  ○ By Time                      └─┘  │
  │  ○ Continuous                        │
  │ Values                               │
  │   Meas.Variation (+/-): pH 0.01      │
  │   Time:              6s               │
  │        ┌────────┐    ┌────────┐      │
  │        │   OK   │    │ Cancel │      │
  │        └────────┘    └────────┘      │
  └─────────────────────────────────────┘
```

Configuration with values. The meter will show the options at the top of the display and the corresponding values at the bottom. Use the arrow keys to highlight an option.

```
H10C                 13:50:00  28-11-2011
Conductivity
Calibrate Cond.                       ████



  ┌─────────────────────────────────────┐
  │ Conductivity Calibration Setup   🔖  │
  ├─────────────────────────────────────┤
  │ Molar (KCl)                     ┌─┐  │
  │                                 │?│  │
  │   Select Standards (min. 1, max. 3): │
  │   ☒ 147 µS/cm                        │
  │   ☐ 1412 µS/cm                       │
  │   ☐ 12.89 mS/cm                      │
  │   ☐ 111.8 mS/cm                      │
  │ ┌────────┐ ┌──────┐  ┌────────┐      │
  │ │ Unmark │ │  OK  │  │ Cancel │      │
  │ └────────┘ └──────┘  └────────┘      │
  └─────────────────────────────────────┘
```
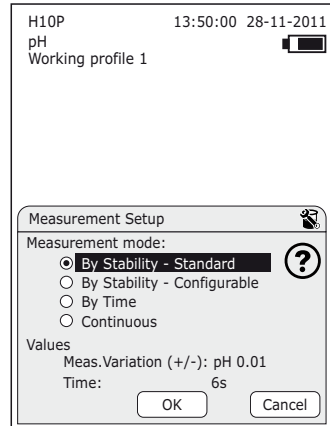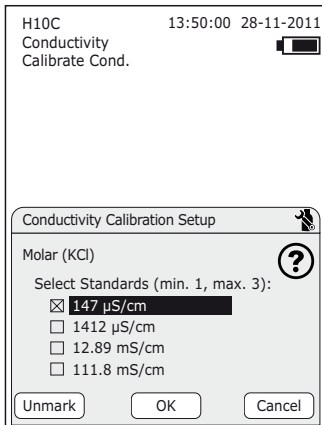
Multiple selections. The user may select more than one item from some lists. Use the arrow keys to highlight the desired value and press *MARK/UNMARK* to select or deselect. Press *OK* to accept the changes or *CANCEL* to leave without making any changes.

```
H10P                 13:50:00  28-11-2011
pH
Working profile 1                     ████



  ┌─────────────────────────────────────┐
  │ Measurement Setup               🔖   │
  ├─────────────────────────────────────┤
  │ Measurement mode:                    │
  │  ○ By Stability - Standard      ┌─┐  │
  │  ◉ By Stability - Configurable  │?│  │
  │  ○ By Time                      └─┘  │
  │  ○ Continuous                        │
  │ Values                               │
  │   Meas.Variation (+/-): pH 0.03      │
  │   Time:              4s               │
  │ ┌────────┐ ┌──────┐  ┌────────┐      │
  │ │Criteria│ │  OK  │  │ Cancel │      │
  │ └────────┘ └──────┘  └────────┘      │
  └─────────────────────────────────────┘
```
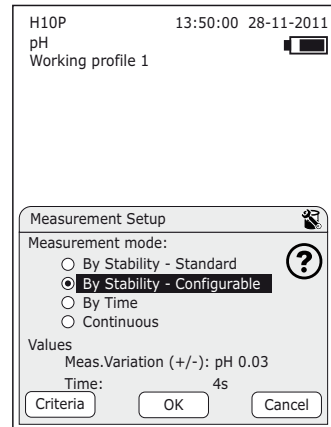
User-configurable options. When the options are user-configurable, the meter will show a button to access the modification screens (CRITERIA in this example). Press *OK* to accept the changes or *CANCEL* to leave without making any changes.

Section 6   Startup

6.1   Turning the meter on and off

> ## *N O T I C E*
>
> Make sure that the probe is connected to the meter before the meter is turned on.

Hold down the power key to turn the meter on or off. If the meter does not turn on, make sure that the batteries are properly installed.

Note: The meter is set to automatically power off after 5 minutes of inactivity to maximize the battery life.

6.2   Initial startup

The display language and other parameters are selected when the meter is started up for the first time.

1. The "startup screen" shows the model, serial number, date, time and software version.

2. Use the arrow keys to select a language from the list.

3. Choose the multisensor probe connected to the meter (only in H30PCO and H30PCD meters).

4. Use the arrow keys to change the date and time format and select by pressing *OK*. Press *DATE/TIME* to change the date and time. Move to the next screen using *OK*.

5. Select temperature units.

6. Select Data Logger setup

   • *OFF*: Data logger options are turned off.

   • *OVERWRITE*: The data logger is on; when the memory is full new data will replace the oldest data.

   • *ALARM WHEN FULL*: The data logger is on; when the memory is full the instrument will display an alarm message.

7. Standby screen; indicates when calibration is required.

8. Perform a calibration; the instrument is not factory-calibrated. The user must perform a calibration or select a theoretical calibration (see 7.1.1 Calibration settings on page 19) before sample measurements will be possible.

Note: Upon subsequent startups, the meter will change from the "startup" to the "standby" screen.

Note: All of these parameters can be changed in the Meter options on page 29 menu.

Section 7   Standard operations

7.1   Calibration

<div style="background-color: yellow; border: 2px solid black; padding: 10px;">

⚠ C A U T I O N

Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current material safety data sheets (MSDS) for safety protocols.

</div>

7.1.1   Calibration settings

The calibration settings contain the calibration type, stability criteria and calibration limits.

The factory settings for calibration are:

1. pH Calibration:

    - Buffer type: Technical buffers (set: 1.68, 4.01, 7.00, 10.01, 12.45)

    - Number of points: 2

    - Stability criteria: Standard (values: measurement variation ± 0.01 pH, time 6s)

    - Acceptance limits (for calibration): Standard (values: offset 30.0 mV, slope 70-105%)

2. ORP Calibration:

    - Buffer type: Theoretical Values

3. Conductivity Calibration:

    - Buffer type: Molar (KCl)

    - Molar (KCl): 1412 µS/cm

    - Acceptance limits (for calibration): Standard (constant theoretical from 0.001 to 199.999 cm^{-1})

4. Dissolved oxygen calibration:

    - Buffer type: Water saturated air

To change these settings,

1. Press *CALIBRATE* from the standby screen.

2. Select the channel of the parameter, if appropriate.

3. Select *CALIBRATION SETUP* 🖎 to enter the calibration menu.

4. Select the following options:

Note: The calibration menus can be password-protected, see .

Table 1   Calibration setup

Option	Description
pH calibration	
Buffer Type (type of calibration)	Technical Buffers (select from the sets provided): Set 1 (USA): pH 1.68, 4.01, 7.00, 10.01 and 12.45 (at 25 ºC) Set 2 (EU): pH 1.68, 4.01, 6.87 and 9.18 (at 25 ºC)
	NIST Buffers (select from the sets provided): Set 1: pH 1.679, 4.005, 6.865, 9.180 and 12.454 (at 25 ºC) Set 2: pH 1.679, 4.005, 6.865, 10.012 and 12.454 (at 25 ºC) Set 3: pH 1.679, 4.005, 7.000, 9.180 and 12.454 (at 25 ºC) Set 4: pH 1.679, 4.005, 7.000, 10.012 and 12.454 (at 25 ºC)
	To a Specific Value: Manually define a single custom buffer value
	Data Introduction: Manually enter the probe constant (no physical calibration) Select the Offset from - 70 mV to +70 mV (preset 0.0 mV) Select the Slope between -70.00 mV/pH to -35.00 mV/pH (preset -59.16 mV/pH) Select the Temperature between 0.0 ºC to 99.9 ºC (preset 25 ºC)
	Theoretical Values: Calibration is based on theoretical data at 25 ºC (no physical calibration). Refer to table
Number of Points	Up to 5 calibration points Technical Buffers: 1 to 5 for Set 1 and 1 to 4 for Set 2 NIST Buffers: 1 to 5
Stability Criteria	Standard: Variation of ± 0.01* pH, Time 6 s
	Configurable: select the pH variation allowed with the time pH: select between 0.02 pH and 0.99 pH (preset to ± 0.02* pH) Time: select from 2 - 10 seconds (preset to 5 s)
Acceptance Limits (for calibration)	Standard. Offset: ± 30.0 mV. Slope: 70% - 105%
	Configurable: select the offset and min/max slope allowed. Offset: select between ± 5.0 mV to ± 70.0 mV (preset to ± 20.0 mV) Slope-Maximum limit: select from 100% to 150% (preset 105%) Slope-Minimum limit: select from 70% to 105% (preset 85%)
ORP calibration	
Standard Type (type of calibration)	Standard 220 mV @25 ºC
	To a Specific Value: Manually define a single custom standard value
	Data Introduction: Manually enter the probe constant (no physical calibration). Select offset between - 500.0 mV and + 500.0 mV
	Theoretical Values: calibration uses meter theoretical data at 25ºC (no physical calibration)

Table 1   Calibration setup

Option	Description
Stability Criteria	Standard: variation of ± 1*** mV, time 6 seconds
	Configurable: select the mV variation allowed with time mV: select between ± 1 mV and ± 5 mV (preset ± 1 mV) Time: select from 2 - 10 seconds (preset to 5 s)
Acceptance Limits (for calibration)	Standard, Offset ± 50.0 mV
	Configurable: select the allowable mV variation Select offset between ±5.0 mV to ±500.0 mV (preset to ± 45.0 mV)
Conductivity calibration	
Standard Type (type of calibration)	Molar (KCl)
	Demal (KCl)
	NaCl St. 1014.9 µS/cm
	To a Specific Value: Manually define a single custom standard value
	Data Introduction: Manually enter the cell constant (no physical calibration). Select between 0.001 and 199.999 cm^{-1}
	Theoretical Values: Calibration uses meter theoretical data at 25ºC, cell constant C=1.00 cm^{-1} (no physical calibration)
Molar Standards / Demal Standards (standard selection)	Molar (KCl): at least 1 standard, 147 µS/cm, 1412 µS/cm (preset), 12.89 mS/cm and 111.8 mS/cm
	Demal (KCl): Select at least 1 standard, 1409 µS/cm (preset), 12.85 mS/cm and 111.31 mS/cm
Acceptance Limits (for calibration)	Standard: theoretical values from 0.001 to 199.999 cm^{-1}
	Configurable: select the theoretical constant and variation (%). Constant, select between 0.001 and 199.999 cm-1 (preset to 1.000 cm^{-1}). Percentage, select between 2% and 100% (preset to ± 30%)
Dissolved Oxygen (DO) calibration	
Standard Type** (type of calibration)	Water Saturated Air
	Water Sat. Air & Zero
	To a Specific Value: Manually define a single dissolved oxygen standard value
	Theoretical Values: Calibration is set to theoretical data (no physical calibration)

*The measurement variation of the stability criteria depends on the selected buffer type:

- For Technical Buffers, Measurement variation = ± 0.01 pH (0.02 to 0.99 pH)

- For NIST Buffers, Measurement variation = ± 0.005 pH (0.02 to 0.99 pH)

- For calibration "To a Specific Value", depends on the selected measurement resolution

**The units for dissolved oxygen calibration are always %

***The measurement variation of the stability criteria depends on the selected buffer type:

- For Standard 220 mV @25 ºC buffer, Measurement variation = ± 1 mV

- For calibration "To a Specific Value", Measurement variation = ± 1.0 mV (from 0.1 to 5.0 mV)

7.1.2   Calibration procedure

This procedure is for general use with liquid calibration solutions. Refer to the documents that are included with each probe for additional information.

1. Pour the buffer or calibration standards into labeled calibration vessel.

2. Rinse the probe with deionized water and put the probe into the first calibration vessel. Make sure that there are no air bubbles under the probe tip.

3. From the standby screen press *CALIBRATE*. Select the parameter for calibration, if appropriate.

4. Press *READ* to measure the first calibration solution. When the measurement is stable, the instrument will request the next calibration solution.

5. Rinse the probe with deionized water and put the probe into the second calibration vessel. Make sure that there are no air bubbles under the probe tip.

6. Press *READ* to measure the second calibration solution.

7. Repeat steps 5 and 6 to measure subsequent calibration points. Calibration points are defined in "Number of points", see Calibration setup on page 20.

8. If the calibration is correct the meter will display the message *CALIBRATION OK* and will save the calibration data. If not it will display an error message.

Note: Press STOP during a calibration to cancel the calibration.

Note: If using a probe without a temperature sensor use the direction arrows during calibration to change the temperature. Wait 5 seconds until the new value is set.

7.1.3   Calibration to a specific value

The user can manually define a single custom standard value. When "To a Specific Value" is selected as buffer/standard type, the instrument behaves as though it were calibrated with a single standard solution.

1. From the standby screen press *CALIBRATE*. Select the parameter for calibration, if appropriate.

2. Select *CALIBRATION SETUP* 🕯 .

3. Select the option *BUFFER/STANDARD TYPE* and choose *TO A SPECIFIC VALUE.* Press *EXIT* to leave the calibration setup menu.

4. Press *READ* to measure in the calibration solution.

5. When measure is stable the instrument will prompt to adjust the measured value. Adjust the value and press *OK*.

6. If the calibration is correct the meter will display the message *CALIBRATION OK* and will save the calibration data. If not it will display an error message.

7.1.4   View the calibration data

To view the current calibration data:

1.   From the standby screen press *CALIBRATE*. Select the parameter, if appropriate.

2.   Select *CAL.DATA*.

3.   Select the *CURRENT CALIBRATION* option. The data from the last calibration is shown.

The instrument saves the last 10 calibrations in memory for each parameter. To view stored calibration data:

1.   From the standby screen press *CALIBRATE*. Select the calibrated parameter, if appropriate.

2.   Select *CAL.DATA*.

3.   Select the *CALIBRATION RECORDS* option.

4.   Use the arrow keys to view the different records.

The calibration data include: date and time, total time for calibration, standard used and user. Also, depending on the parameter calibrated:

- pH: The slope and slope % values, the mV value measured, the deviation (in mV), time and calibration temperature for each buffer.
- ORP: The deviation (in mV) and temperature.
- Conductivity: The cell constant, the time and the calibration temperature for each standard.
- DO: The current (in nA) and temperature.

7.1.5   Temperature correction

The temperature can be adjusted to 25 °C (77 °F) and 85 °C (185 °F) to correct potential probe deviations.

1.   Put the probe and a reference thermometer in a container of water at approximately 25 °C and allow the temperature to stabilize.

2.   Compare the temperature read by the meter with that of the reference thermometer. The difference is the adjustment value for the meter. Example: reference thermometer: 24.5 °C; meter: 24.3 °C. Adjustment value: 0.2 °C.

3.   Enter the adjustment value for the 25 °C reading:

    a.   From the standby screen press *TO SYSTEM* ✕ .

    b.   Select *TEMPERATURE CORRECTION*. Select the channel in which you wish to make the adjustment, if applicable.

    c.   Select *CORRECTION AT 25 °C*.

    d.   Use the arrow keys to enter the adjustment value for 25 °C. Select *OK* to confirm.

4.   Put the probe and a reference thermometer in a container of water at approximately 85 °C and allow the temperature to stabilize.

5. Compare the temperature from the meter with that of the reference thermometer. The difference is the adjustment value for the meter.

    e. Select *CORRECTION AT 85 °C*.

    f. Use the arrow keys to enter the adjustment value for 85 °C. Select *OK* to confirm.

Note: The deviation adjustment can be between -2.0 ºC and +2.0 ºC.

7.2   Sample measurements

Each probe has specific preparation steps and procedures for taking sample measurements. For step-by-step instructions, refer to the user manual included with the probe.

To take a reading:

1. Prepare the probe and the measurement samples.

2. Insert the probe into the sample to be measured. Make sure that there are no air bubbles under the probe tip.

3. Press *READ* from the standby screen.

4. Select the channel for the parameter to be measured, if appropriate.

The instrument will measure the sample according to the parameters set in the measurement setup.

Note: If using a probe without a temperature sensor the user can enter the temperature manually. Use the direction arrows during the measurement to change the temperature. Wait 5 seconds until the new value is set.

7.2.1   Measurement setup

The measurement setup contains the measurement mode, Data Logger, sample ID and the options for each measurement parameter.

1. Press *M.SETUP* to change the measurement setup.

2. Select the channel of the parameter to setup, if appropriate.

3. Use arrow keys for navigation, press *SELECT* to view details or change.

Note: The measurement setup menu can be password-protected, see Meter options on page 29.

Table 2   Measurement setup

Option	Description
pH setup	
Electrode	Select between: pH and ORP
Resolution	Select between 0.1, 0.01 and 0.001
View mV	Select "Yes" or "No" to display simultaneous mV measurement
Measurement Mode	By Stability - Standard Criteria pH measurement variation ± 0.01*, time 6 s

Table 2   Measurement setup

Option	Description
Measurement Mode	By Stability - Configurable Criteria Measurement variation, select between 0.002 and 0.999 pH (preset to ± 0.02*). Time, select between 2 and 10 s (preset to 5 s)
	By Time Select the measurement duration (hh:mm:ss) Select the measurement acquisition interval (hh:mm:ss) (only displayed when the data logger is on and set to automatic)
	Continuous: with a programmable acquisition interval Select the measurement acquisition interval (hh:mm:ss) (only displayed when the data logger is on and set to automatic)
ORP setup	
Electrode	Select between: pH and ORP
Resolution	Select between 0.1 and 1
Measurement Mode	By Stability - Standard Criteria Measurement variation ± 1** mV, time 6 s
	By Stability - Configurable Criteria Measurement variation, select between ±1 and ±5 mV (preset to ± 1** mV) Time, select between 2 and 10s (preset to 5 s)
	By Time Select the measurement duration (hh:mm:ss) Select the measurement acquisition interval (hh:mm:ss) (only displayed when the Data Logger is on and set to automatic)
	Continuous: with a programmable acquisition interval Select the measurement acquisition interval (hh:mm:ss) (only displayed when the Data Logger is on and set to automatic)
Conductivity setup	
Parameters	Select between: Conductivity, Resistivity, Salinity or TDS
Temp. Coefficient	Select between 0.00 and 9.99/ºC (preset to 2.00/ºC)
Ref. Temp. (reference temperature)	Select between: 15, 20, 25 ºC or Custom Custom: enter a reference temperature between 0 and 99 ºC (preset to 25 ºC)
View Ohms	Select "Yes" or "No" to simultaneously display the resistivity measurement
TDS Factor	This option is displayed when TDS is selected as the parameter Enter a factor between 0.01 and 4.44 (preset to 0.64)
Measurement Mode	By Stability
	By Time Select the measurement duration (hh:mm:ss) Select the measurement acquisition interval (hh:mm:ss) (only displayed when the data logger is on and set to automatic)

Standard operations

Table 2   Measurement setup

Option	Description
Measurement Mode	Continuous: with a programmable acquisition interval Select the measurement acquisition interval (hh:mm:ss) (only displayed when the data logger is on and set to automatic)
Dissolved Oxygen (DO) options	
Units	Select % or mg/L
Barometric Pressure	Select a pressure between 600 and 1133 mBar (450 mmHg and 850 mmHg). Default value: 1013 mBar
Salinity Correction	Manual: enter a correction factor between 00.0 and 45.0 g/L (preset to 1.0 g/L)
View nA	Select "Yes" or "No" to show the simultaneous nA measurement on the screen
Measurement mode	By stability
	By time Select the measurement duration (hh:mm:ss) Select the measurement acquisition interval (hh:mm:ss) (only displayed when the Data Logger is on and set to automatic
	Continuous: with a programmable acquisition interval. Select the measurement acquisition interval (hh:mm:ss) (only displayed when the Data Logger is on and set to automatic)
Options available for all channels	
Data Logger	This option is displayed when the Data logger is on (see Meter options on page 29) Automatic-All Readings Stored. The instrument will store measurements according to the Measurement Mode configured Manual-Press to Record Data. The meter will display an option for storing measurement data manually
Sample ID	This option is displayed when the Data logger is on (see Meter options on page. 29) Automatic: the instrument will give a consecutive numerical ID for each sample Manual: the user will identify each sample

* The stability criteria depends on the resolution selected:

- For resolution 0.1, measurement variation: ± 0.1 pH

- For resolution 0.01, measurement variation: ± 0.01 pH

- For resolution 0.001, measurement variation: ± 0.005 pH

** The stability criteria standard depends on the resolution selected:

- For resolution 1 mV, measurement variation: ±1 mV

- For resolution 0.1 mV, measurement variation: ± 0.2 mV

7.2.2 Measurement modes

The instrument has 3 different measurement modes:

1. **Measurement by stability**: the measurement is complete when the signal from the probe remains constant for the specified time. Select the standard stability criteria or custom-define one in the measurement setup. Press *STOP* during a measurement to stop the measurement. When the measurement is complete, press *READ* to take a new measurement or *EXIT* to quit.

Note: If the Data Logger is on and set to "Automatic" it will store the measurement once it has stabilized. If the Data Logger is on and set to "Manual" a soft key option to store will appear once the measurement is complete; select to store the measurement.

2. **Measurement by time**: the measurement will be displayed after a defined period of time. Select the measurement duration in the Measurement setup. Press *STOP* during a measurement to stop the measurement. When the measurement is complete, press *READ* to take a new measurement or *EXIT* to quit.

Note: If the Data Logger is on and set to "Automatic" it will store the measurement according to the defined acquisition interval and at the end of the programmed time. If the Data Logger is on and set to "Manual" a soft key option to store will appear once the measurement is complete; select to store the measurement.

3. **Continuous measurement**: the instrument displays the value measured at any given moment. To complete the measurement press *HOLD* and then *EXIT*.

Note: If the Data Logger is on and set to "Automatic" it will store the measurement according to the defined acquisition interval and will continue for the defined duration. If the Data Logger is on and set to "Manual" a soft key option to store will appear once the measurement is complete; select to store the measurement.

7.2.3 pH and ORP measurement setup

Once the meter has been calibrated it is ready for pH or ORP measurements without additional setup.

Factory settings for pH measurements:

- Electrode: pH
- Resolution: 0.01
- Measurement mode: By Stability-S. (standard criteria: pH ± 0.01, 6s)
- View mV: No

Factory settings for ORP measurements

- Resolution: 1 mV
- Measurement mode: By Stability-S. (standard criteria: ± 1 mV, 6s)

Press *M.SETUP* to change the measurement setup.

7.2.4 Conductivity measurement setup

Once the meter has been calibrated it is ready for conductivity measurements without additional setup.

Factory settings for conductivity measurements:

- Parameters: Conductivity
- Temperature coefficient (TC): Linear 2.00 %/ºC
- Reference temperature (Ref. Temp.): 25 ºC
- View Ohms: No
- Measurement mode: By Stability

Note: The stability criteria for conductivity measurements is not user definable.

Note: The meter will display "TC:L" on conductivity measurement screens if there is a temperature coefficient.

Press *M.SETUP* to change the measurement setup.

7.2.5   Dissolved oxygen measurement setup

Factory settings for dissolved oxygen measurements:

- Units: mg/L
- Barometric pressure: 1013
- Salinity correction: 1.0
- View nA: No
- Measurement mode: By Stability

Note: The stability criteria for dissolved oxygen measurements is not user definable.

Press *M.SETUP* to change the measurement setup.

Before calibration or measurement of dissolved oxygen, the probe must be polarized and the settings for atmospheric pressure and salinity must be entered.

7.2.5.1   Polarizing the DO electrode

If the probe or batteries are disconnected, connect the probe and/or install the batteries. Next, wait until the electrode polarizes (per the times indicated in Table 3)

Table 3 Polarizing the DO probe

Disconnection time	Polarization time
< 5 minutes	10 minutes
5 to 15 minutes	45 minutes
> 15 minutes	6 hours

Section 8   Advanced operations

8.1   Meter options

To access meter options

1. Press *TO SYSTEM* ✕ on the standby screen.

2. Select *METER OPTIONS*.

3. Select and modify the following options:

Note: The setup menu can be password-protected.

Table 4 Meter options

Option	Description
Backlight	(Only with Outdoor option deactivated) Select the display backlight (0 to 100%)
Outdoor Option	None: the outdoor option is deactivated
	Active: the meter sets the display lighting to facilitate outdoor operation
Date & Time	Select to change the date format, date and time
Data Logger	OFF: The data logger options are inactive
	Overwrite: The data logger is on. When the memory is full new data will replace the oldest data
	Alarm When Full: The data logger is on. When the memory is full, the instrument will display an alarm message
Sounds	Key Press: OFF; turns off key sounds
	Key Press: ON; turns on key sounds
Instrument ID	The user can enter up to 20 characters that will identify the instrument (the preset ID is the meter model)
Password	None: password off
	Active: A 5 digit programmable password restricts access to "Calibration Setup", "Measurement Setup" and "Meter Options"
Profiles	None: The instrument will work with the default program. This program can be changed in Measurement setup on page 24
	Active: Up to 10 configurable measurement programs (PROFILES) can be created, see Manage profiles on page 32
Temperature Units	Select between °C and °F
Language	Select language: English, German, French, Italian and Spanish
Auto Power OFF	The meter will turn off after a defined period of inactivity to maximize battery life. Select between: 5, 15, 30, 60 minutes or Inactive to deactivate Auto Power off
Users	(Only with Data Logger active) None: The instrument will not identify users
	Active: A list of up to 10 users can be created. The instrument will store the user ID for measurements and calibration data

Table 4 Meter options

Option	Description
Reset Sample ID	(only with Data Logger active) This option deletes the data counter from the Data Logger and starts the automatic sample ID at sample 000001
Restore to Factory Settings	This options restores the meter to the factory default settings

8.2   Probe data

The instrument can store various information about the probe being used.

1.   Press *TO SYSTEM* ✗ from the standby screen.

2.   Select *PROBE DATA,* select the desired channel if appropriate.

3.   Select *HISTORY.* The following information will be displayed on the screen:

   •   Initial Time: Date and time of installation

   •   Service Time: Total time of sensor use

   •   Number of measurements

   •   Maximum and minimum values measured by the sensor

4.   Select *RESET HISTORY* to erase the stored probe data.

Note: The option RESET HISTORY is password protected.

8.3   Use a sample ID

The sample ID is used to associate measurements with a particular sample location. If used, stored data will include this ID.

This option is activated when the Data Logger is on. Refer to Sample measurements on page 24.

1.   From the standby screen press *M.SETUP.*

1.   Select the parameter, if applicable.

2.   Select the option *SAMPLE IDENTIFICATION*

   a.   Automatic: A consecutive number will be automatically given to each sample.

   b.   Manual: the user must manually enter the ID of each sample.

8.4   Password

The user can define a 5 digit numerical password that restricts access to "Calibration Setup", "Measurement Setup" and "Meter Options".

1.   Press *TO SYSTEM* ✗ from the standby screen.

2.   Select *METER OPTIONS.*

3.   Select the *PASSWORD* option.

4. Select *ACTIVE* and press *PASSWORD* to enter the password.

Note: This option is password-protected. When the ACTIVE option is activated, the meter will request the default password: 54321.

5. Enter a 5 digit numerical password.

6. Confirm the new password.

Note: If password-protection is disabled, the meter will set the default password for subsequent activation.

8.5   Change the date and time

The date and time can be changed from the Date/Time menu.

1. Press *TO SYSTEM* ✕ from the standby screen.

2. Select *METER OPTIONS.*

3. Select *DATE & TIME*.

4. Select the date format and confirm by pressing *OK*.

5. Press *DATE/TIME* to change the date and time. Scroll through and change values with the arrow keys. Confirm with *OK*.

6. Press *OK* to exit.

8.6   Adjust the display lighting

The meter screen can be set to specific light conditions making it easier to read.

1. Press *TO SYSTEM* ✕ *from the standby screen.*

2. Select *METER OPTIONS*.

3. Select *BACKLIGHT*. This option is only active when the "Outdoor option" is set to none.

4. Select a setting and confirm.

The meter also has an option that sets the display lighting to maximum values to facilitate the outdoor operating.

N O T I C E

Enabling this option will drastically increase the battery consumption.

1. Press *TO SYSTEM* ✕ *from the standby screen.*

2. Select *METER OPTIONS*.

3. Select *OUTDOOR OPTION* and *ACTIVE*

8.7   Manually enter the temperature

Temperatures can be entered manually while measuring or calibrating when working with non-temperature compensating probes.

1. Press the *UP/DOWN* direction keys on a measurement or calibration. The temperature will be highlighted on the display.

2. Use the arrow keys to change the temperature. The new value will be set if no key is pressed for 5 seconds.

8.8   Test user interface

The user can test the functionality of the display and the keypad.

1. Press *TO SYSTEM* ✕ *from the standby screen.*

2. Select *TEST USER INTERFACE.*

3. Select *TEST DISPLAY* to test the screen. The instrument will turn off/on all of the display's pixels for 6 seconds.

4. Select *TEST BUTTONS & SOUND* to test the keypad. Press the keys to test their operation. The instrument will quit the test if no keys are pressed within 6 seconds.

8.9   Manage users

The instrument can identify up to 10 different users. User IDs are stored with the measurements and calibrations.

1. Turn on users in Meter options on page 29.

2. Press *MANAGE* to edit, delete or add users.

3. Perform a calibration. The instrument will prompt for the User ID.

4. Perform a reading. The instrument will prompt for the User ID.

8.10 Manage profiles

Profiles are different measurement setup configurations that can be stored inside the meter. The instrument can store up to 10 different profiles. This enables the user to change between different measurement setups, simply by selecting the appropriate profile.

If profiles are off, the instrument will store the measurement setup options in the default profile (PROFILE 0).

To turn on profiles:

1. Press *TO SYSTEM* ✕ from the standby screen then select *METER OPTIONS*.

2. Select *PROFILES*.

3. Press *MANAGE* to add, delete or edit profiles.

Note: When creating a profile, the instrument will copy the current measurement setup to the new profile.

4. Press *SELECT PROFILE* on the standby screen to select the appropriate profile.

5. Enter *M.SETUP* to change the setup. The changes will be saved in the profile selected.

6. Perform the readings with the profile selected.

7. Press *SELECT PROFILE* on the standby screen to select a different profile.

8.11 Restore the factory settings

This option erases all data stored in the meter and reverts all the settings and configurations to the factory default settings.

1. Press *TO SYSTEM* ✕ from the standby screen.

2. Select *METER OPTIONS.*

3. Select the *RESTORE TO FACTORY SETTINGS* option and confirm.

Note: It is necessary to perform this procedure to change the multisensor probe model used with H30PCO and H30PCD meters. See 4.2.2 Multisensor probe connection on page 11.

Section 9   Data logger

The instrument can store up to 500 measurements.

9.1   Activate the Data logger

1. Press *TO SYSTEM* ✖ from the standby screen. Select *METER OPTIONS.*

2. Select *DATA LOGGER*. Select one of the following options:

    a. *OFF*: The data logger options are turned off.

    b. *OVERWRITE:* The data logger is on. When the memory is full, new data will replace the oldest data.

    c. *ALARM WHEN FULL*: The data logger is on. When the memory is full, the instrument will display an alarm message.

9.2   Store data

Each record in the data logger includes: sample ID, value measured, measurement duration, sample temperature, stirring speed, probe ID (where applicable), date and time the sample was taken, user (where applicable) and profile (where applicable).

The instrument stores the data either automatically or manually, depending on how the data logger option is programmed at measurement setup, see .

1. On the *AUTOMATIC* setting the instrument stores data according to the Measurement Mode settings:

    •   By stability: the measurement is stored when the reading is stable.

    •   By time: measurements are stored according to the programmed acquisition interval and at the end of the programmed measurement duration.

    •   Continuous: measurements are stored according to the programmed acquisition interval.

2. On the *MANUAL* setting the meter will display an option on the measurement and calibration screens, which enables the user to save data manually.

•   When the meter stores a record the Data logger will display the icon:

→🗂

•   If the Data logger is full and the meter can't save the data, the following icon will be displayed:

🗵

9.2.1   Sample identification

The instrument identifies samples either automatically or manually, depending on the programming in .

•   Automatic identification: a consecutive number is automatically assigned to each sample.

Note: This counter can be reset to zero by selecting the "RESET SAMPLE ID" option in *.*

- Manual sample ID: the user must manually enter the ID of each sample.
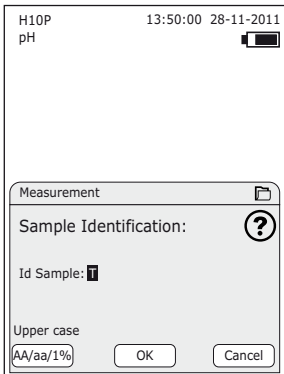
Figure 8 Manual sample ID entry

Press the "AA/aa/1%" button to move between the different character options:
capitals, lower case and numbers/symbols. Use the *UP/DOWN* direction keys to
change the value. Use the *LEFT/RIGHT* directions keys to scroll to the next
character. Confirm with *OK*.

9.3   View measurement data

1.   Press *TO DATA LOGGER* 📁 from the standby screen.

2.   Select one of the following options:

Table 5   View measurement data

Option	Description
View All	Displays a list of all of the stored measurements
View by Date	Displays a list of measurements stored within a certain date interval. Select the start and end date
View by Profile	Displays a list of the measurements stored in each PROFILE when the PROFILES option is activated
View by User	Displays a list of measurements stored by each user when the USERS option is activated
Delete All Data	Clear all data stored in the DATA LOGGER

3.   The instrument displays a list of stored measurements, based on the selected
data view option.

4.   Select a measurement and press *VIEW* to see measurement details.

5.   Press *SEND* to send the data.

6.   Press *EXIT* to return to the list.

9.4 Send data to a PC: PC CSV format

For sending the stored data on Data Logger to a connected PC just connect a USB cable to the meter, then access the Data Logger screen.

1. Press *TO DATA LOGGER* 📋 from the standby screen.

2. Select the desired option ("View All" to send all data records)

3. Press the button-option on screen to send the data..

The serial port parameters of the PC application receiving the information must be set as follows:

Table 6 Serial port configuration

Baud rate	115200
Data bits	8
Parity	None
Stop bits	1
Flow control	None

Important Note: A serial COM ports application, i.e. Windows Hyperterminal, should be used to communicate the instrument with the PC. Refer to the OS help to configure the application.

*Important Note: When using a computer program to communicate with the meter, close the computer program **before** turning off the meter. Failure to close the computer program will result in lost communication.*

Note: To send the data to a PC, the instrument must be connected to the PC via a mini-USB/USB cable (Cat. No. 89236-588).

When the user sends the Data Logger to the PC the meter sends a CSV line for every Data Logger record. Each CSV line can contain the following comma separated items:

GI;MO;ID;RID;PRF;TOM;SID;UN;DTF;DATE;TIME;TMT;M1;TCT1;TCV1;TCU1; TREF1;TREFU1;MU1;AM1;AMU1;TEMP1;TEMPU1;M2;MU2;AM2;AMU2;TEMP2 ;TEMPU2;TCT3;TCV3;TCU3;TREF3;TREFU3;M3;MU3;AM3;AMU3;TEMP3;TEM PU3;**EOLCR**

Note: Items are always sent in the same order as the line above. Bold items are common to all meters models.

9.4.1 CSV measurement item descriptions

Table 7 CSV measurement item descriptions

Item	Name	Description
GI	General index	Index number that consecutively logs each measurement and each time the data log is sent to a PC
MO	Equipment model	Identifies the instrument model (H10P, H10C)

Table 7 CSV measurement item descriptions

Item	Name	Description
ID	Instrument identifier	Optional instrument identifier in the meter options menu that user can set
RID	Record Identifier	Possible values are: DL_ST; DL_IT; DL_RE
DL_ST	Record ID (value)	Identifies the record as the first measurement of a "By Time" or "Continuous" measurement
DL_IT	Record ID (value)	Identifies the record as an intermediate measurement of a "By Time" or "Continuous" measurement
DL_RE	Record ID (value)	Identifies the record as a "By Stability" measurement or as the last record of a "By Time" or "Continuous" measurement
PRF	Profile name	Identifies the profile name used (if any)
TOM	Type of measurement	Possible values are: S (for Stability); C (for Continous); T (for By Time)
SID	Sample Identifier	Identifies the "Sample ID" when the meter is set to automatic sample identification, or the user entered ID when the meter is set to manual
UN	User Name	User name of the operator that took the reading
DTF	Data time format	Possible values are: 0 (MM/DD/YYYY 12H); 1 (DD-MM-YYYY 12H); 2 (YYYY-MM-DD 12H); 3 (MM/DD/YYYY 24H); 4 (DD-MM-YYYY 24H); 5 (YYYY-MM-DD 24H)
DATE	Date of the measurement	Date of the measurement
TIME	Time of the measurement	Time of the measurement
TMT	Total measuring time	Total elapsed time between start and end of measurement
M1,M2,M3	Channel x measured value	Measured value of the indicated channel
MU1,MU2,MU3	Channel x measurement units	Measurement units of the indicated channel
AM1,AM2,AM3	Channel x auxiliary measurement value	Optional accompanying measurement (example: mV when measuring pH; resistivity when measuring conductivity)
AMU1, AMU2, AMU3	Channel x auxiliary measurement units	Units of the optional accompanying measurement (example: ohms for resistivity)
TEMP1, TEMP2, TEMP3	Channel x Temperature value	Temperature value of the indicated channel
TEMPU1, TEMPU2, TEMPU3	Channel x Temperature units	Temperature units of the indicated channel

Table 7 CSV measurement item descriptions

Item	Name	Description
TCT1, TCT3	Temperature Compensation Type	Type of temperature compensation (TC) in conductivity channels. Possible values are: Linear or Natural Waters
TCV1, TCV3	Temperature Compensation Value	Identifies the value of the temperature compensation in conductivity channels
TCU1, TCU3	Temperature Compensation Units	Units of temperature compensation in conductivity channels. Always set to %
TREF1, TREF3	Reference Temperature value	Identifies the value of reference temperature in conductivity channels
TREFU1, TREFU3	Reference Temperature Units	Unist of reference temperature in conductivity channels. Always set to %
EOLCR		Characters to signify the end of the CSV report

9.4.2   CSV items depending on the model

1.   For H10P & H10D models:

GI;MO;ID;RID;PRF;TOM;SID;UN;DTF;DATE;TIME;TMT;M1;MU1;AM1;AMU1;TEMP1;TEMPU1;**EOLCR**

H10P example:
00001;H10P;H10P;DL_RE;;S;000005;;4;28-06-2012;09:25:29;00:06;7.52;pH;-31.1;mV;27;°C;

2.   For H10C models:

GI;MO;ID;RID;PRF;TOM;SID;UN;STU;DTF;DATE;TIME;TMT;TCT1;TCV1:TCU1;TREF1;TREFU1;M1;MU1;AM1;AMU1;TEMP1;TEMPU1;**EOLCR**

H10C example:
*00001;H10C;H10C;DL_RE;;S;000004;;4;28-06-2012;09:30:28;00:06;Linear;2.5;%;26;°C; 1.00;µS/cm;1000;KOhm*cm; 25;°C;*

3.   For H30PCO & H30PCD models

GI;MO;ID;RID;PRF;TOM;SID;UN;DTF;DATE;TIME;TMT;M1;MU1;AM1;AMU1;TEMP1;TEMPU1;M2;MU2;AM2;AMU2;TEMP2;TEMPU2;TCT3;TCV3;TCU3;TREF3;TREFU3;M3;MU3;AM3;AMU3;TEMP3;TEMPU3;**EOLCR**

Note: All items are always sent, even if channel x is inactive (item values of inactive channels are left blank).

H30PCO example, all channels active:
00001;H30PCO;H30PCO;DL_RE;;S;000001;;4;01-06-2012;00:00:50;00:10;7.00;pH;0;mV;25;°C;0;mV;0;;25;°C; Linear;2.5;%;26;°C;0.00;µS/cm;0;;25;°C;

Section 10 Maintenance

<div style="border:1px solid black; background:yellow;">

⚠ C A U T I O N

Personal injury hazard. Only qualified personnel should carry out the tasks described in this section of the manual.
</div>

10.1 Clean the instrument

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N O T I C E

Never use cleaning agents such as turpentine, acetone or similar products to clean the instrument, including the screen and accessories.
</div>

Clean the outside of the instrument with a moist cloth and a mild soap solution.

10.2 Clean the probe(s)

Clean the probe as required.

Refer to Troubleshooting on page 40 for more information about cleaning.

Refer to the probe documentation for information about probe maintenance.

Use the cleaning agents listed in Table 8 to address the contaminants in the pH probe.

Table 8 pH probe cleaning agents

Contamination	Cleaning agent
Proteins	Pepsin cleaning solution
Oils and fats	Electrode cleaning solution
Lime-scale	0.1 M HCl solution

Section 11 Troubleshooting

Refer to the following table for common error messages, symptoms, possiible causes and corrective actions.

Table 9   Calibration warnings and errors

Error/Warning	Solution
Calibration out of range	Measured value out of range Re-calibrate Connect a new probe
Unstable measurement (time> 120 s)	For pH, conductivity and DO calibrations Re-calibrate Examine the probe* Make sure the probe is properly immersed in the sample
Unstable measurement (time> 240 s)	For ISE calibrations Re-calibrate Examine the probe* Make sure the probe is properly immersed in the sample
Same buffer/standard	Re-calibrate Examine the probe* Examine the buffer solution: Make sure that the buffer used matches the buffer specified in the setup; make sure the temperature specification in the setup; use a new buffer solution
Unknown buffer/standard	
Temperature difference > 3.0 ºC	Adjust the calibration solutions to the same temperature Examine the temperature sensor
Temperature out of range	Examine the temperature sensor Connect a new probe
Outside allowable range	Offset or slope outside the range Make sure the specification in the setup Connect a new probe
Signal too low/high	DO probe error. Examine the probe* Examine the standard solutions
Cell constant over limits	Insert the probe into the appropriate standard and read again Examine the probe* Connect a new probe
Cell constant deviation error	
Not calibrated	There are no calibration data stored in the instrument Perform calibration

* Clean the probe (refer to Clean the probe(s) on page 39 for more information); make sure that there are no air bubbles at the tip. Shake the probe like a thermometer. Disconnect and then re-connect the probe. Connect a different probe to make sure whether the problem is with the probe or the meter.

Table 10   Measurement warnings and errors

Error/Warning	Solution
- - - - - - - - (Measurement out of range)	Measured value out of range Examine the probe*
Unstable measurement (time> 120 s)	For pH, conductivity and DO measurements Examine the probe* Make sure the probe is properly immersed in the sample
Unstable measurement (time> 240 s)	Form ISE measurements Examine the probe* Make sure the probe is properly immersed in the sample

Table 11   Miscellaneous warnings and errors

Error/Warning	Solution
BATTERY (flashing)	Install new batteries
Data logger full	Empty the data logger
All data will be deleted. Are you sure?	Confirm the data to be deleted from the data logger
Invalid Empty Input	Blank data inputs/settings are rejected

Appendix A Standard solutions

A.1 Technical buffer solutions

VWR sympHony™ meters store the following pH/temperature tables in their memory for automatic pattern recognition.

Table 12 pH standards - Set 1 (EU)

Temperature		Solution			
ºC	ºF	1.68	4.01	6.87	9.18
0	32	1.67	4.01	6.98	9.46
10	50	1.67	4.00	6.92	9.33
20	68	1.68	4.00	6.88	9.23
25	**77**	**1.68**	**4.01**	**6.87**	**9.18**
30	86	1.68	4.01	6.87	9.14
40	104	1.69	4.03	6.84	9.07
50	122	1.71	4.06	6.83	9.01
60	140	1.72	4.10	6.84	8.96
70	158	1.74	4.16	6.85	8.92
80	176	1.77	4.22	6.86	8.89
90	194	1.79	4.30	6.88	8.85

Table 13 pH standards - Set 2 (US)

Temperature		Solution				
ºC	ºF	1.68	4.01	7.00	10.01	12.45
0	32	1.67	4.01	7.12	10.30	13.42
10	50	1.67	4.00	7.06	10.17	13.00
20	68	1.68	4.00	7.02	10.06	12.63
25	**77**	**1.68**	**4.01**	**7.00**	**10.01**	**12.45**
30	86	1.68	4.01	6.99	9.96	12.29
40	104	1.69	4.03	6.97	9.88	11.98
50	122	1.71	4.06	6.97	9.83	11.71
60	140	1.72	4.10	6.98	9.76	11.45
70	158	1.74	4.16	7.00	9.71	11.21
80	176	1.77	4.22	7.04	9.67	10.99
90	194	1.79	4.30	7.09	9.64	10.78

A.2 NIST buffer solutions

VWR sympHony™ meters instruments store the following pH/temperature tables in their memory for automatic pattern recognition.

Table 14 NIST pH standards

Temperature		Solution						
ºC	ºF	1.679	4.005	6.865	7.000	9.180	10.012	12.454
0	32	1.666	4.000	6.984	7.118	9.464	10.317	13.424
10	50	1.670	3.997	6.923	7.059	9.332	10.179	13.003
20	68	1.675	4.001	6.881	7.016	9.225	10.062	12.627
25	**77**	**1.679**	**4.005**	**6.865**	**7.000**	**9.180**	**10.012**	**12.454**
30	86	1.683	4.011	6.853	6.987	9.139	9.966	12.289
40	104	1.694	4.027	6.838	6.970	9.068	9.889	11.984
50	122	1.707	4.050	6.833	6.964	9.010	9.828	11.705
60	140	1.723	4.080	6.836	6.968	8.962	9.784	11.449
70	158	1.743	4.116	6.845	6.982	8.921	9.754	11.211
80	176	1.765	4.159	6.859	7.004	8.884	9.739	10.989
90	194	1.792	4.208	6.876	7.034	8.850	9.736	10.778

A.3 Conductivity standard solutions

VWR sympHony™ instruments store the following pH/temperature tables in their memory for automatic pattern recognition.

Table 15 Conductivity standards

Temperature		Demal			Molar				NaCl
ºC	ºF	KCl 1D (mS/cm)	KCl 0.1D (mS/cm)	KCl 0.01D (µS/cm)	KCl 0.001M (µS/cm)	KCl 0.01M (µS/cm)	KCl 0.1M (mS/cm)	KCl 1M (mS/cm	0.05% (µS/cm)
0	32.0	65.14	7.13	773		776	7.15	65.41	540.4
1	33.8	66.85	7.34	796		800	7.36	67.13	557.73
2	35.6	68.58	7.56	820		824	7.57	68.86	525.2
3	37.4	70.32	7.77	843		848	7.79	70.61	592.79
4	39.2	72.07	7.98	867		872	8.00	72.37	610.53
5	41.0	73.84	8.2	891		896	8.22	74.14	628.4
6	42.8	75.62	8.42	915		921	8.44	75.93	646.4
7	44.6	77.41	8.64	940		945	8.66	77.73	664.55
8	46.4	79.21	8.86	965		970	8.88	79.54	682.83
9	48.2	81.03	9.08	989		995	9.11	81.36	701.26
10	50.0	82.85	9.31	1014	105	1020	9.33	83.19	719.82

Standard solutions

Table 15 Conductivity standards

Temperature		Demal			Molar				NaCl
°C	°F	KCl 1D (mS/cm)	KCl 0.1D (mS/cm)	KCl 0.01D (µS/cm)	KCl 0.001M (µS/cm)	KCl 0.01M (µS/cm)	KCl 0.1M (mS/cm)	KCl 1M (mS/cm	0.05% (µS/cm)
11	51.8	84.68	9.54	1039	107	1045	9.56	85.04	738.53
12	53.6	86.54	9.76	1065	110	1070	9.79	86.89	757.37
13	55.4	88.39	9.99	1090	113	1095	10.02	88.76	776.36
14	57.2	90.26	10.22	1116	116	1121	10.25	90.63	795.48
15	59.0	92.13	10.46	1142	119	1147	10.48	92.52	814.74
16	60.8	94.02	10.69	1168	122	1173	10.72	94.41	834.14
17	62.6	95.91	10.93	1194	125	1199	10.95	96.31	853.68
18	64.4	97.81	11.16	1220	127	1225	11.19	98.22	873.36
19	66.2	99.72	11.4	1247	130	1251	11.43	100.14	893.18
20	68.0	101.63	11.64	1273	133	1278	11.67	102.07	913.13
21	69.8	103.56	11.88	1300	136	1305	11.91	104.00	933.22
22	71.6	105.49	12.12	1327	139	1332	12.15	105.94	953.44
23	73.4	107.42	12.36	1354	142	1359	12.39	107.89	973.8
24	75.2	109.36	12.61	1381	145	1386	12.64	109.84	994.28
25	**77.0**	**111.31**	**12.85**	**1409**	**147**	**1412**	**12.89**	**111.80**	**1014.9**
26	78.8	113.27	13.1	1436	150	1440	13.13	113.77	1035.65
27	80.6	115.22	13.35	1464	153	1467	13.37	115.74	1056.53
28	82.4		13.59	1491	156	1494	13.62	115.70	1077.54
29	84.2		13.84	1519	159	1522	13.87	115.70	1098.67
30	86.0		14.09	1547	162	1549	14.12	115.70	1119.92
31	87.8		14.34	1575	165	1581	14.37	115.70	1141.3
32	89.6		14.59	1603	168	1609	14.62	115.70	1162.8
33	91.4		14.85	1632	171	1638	14.88	115.70	1184.41
34	93.2		15.1	1660	174	1667	15.13	115.70	1206.15
35	95.0		16.35	1688	177		15.39	115.70	1228
36	96.8		15.61	1717			15.64		1249.96
37	98.6		15.86	1745					1272.03
38	100.4		16.12	1774					1294.21
39	102.2		16.37	1803					1316.49
40	104.0		16.63	1832					1338.89
41	105.8		16.89	1861					1361.38
42	107.6		17.15	1890					1383.97
43	109.4		17.4	1919					1406.66
44	111.2		17.66	1948					1429.44
45	113.0		17.92	1977					1452.32

Table 15 Conductivity standards

Temperature		Demal			Molar				NaCl
ºC	ºF	KCl 1D (mS/cm)	KCl 0.1D (mS/cm)	KCl 0.01D (µS/cm)	KCl 0.001M (µS/cm)	KCl 0.01M (µS/cm)	KCl 0.1M (mS/cm)	KCl 1M (mS/cm	0.05% (µS/cm)
46	114.8		18.18	2007					1475.29
47	116.6		18.44	2036					1498.34
48	118.4		18.7	2065					1521.48
49	120.2		18.96	2095					1544.71
50	122.0		19.22	2124					1568.01
51	123.8								1591.39
52	125.6								1614.84
53	127.4								1638.37
54	129.2								1661.97
55	131.0								1685.63

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